
Appendix A — Network Numbering

Overview

Whichever dialing plan is used for call routing over a Network from Meridian 1, the basic principal is the same with all programming being carried out in overlays 86, 87 and 90 which are called Electronic Switched Network (ESN).

Codes for translation are identified as either Local or Distant then route selection and digit manipulation are programmed accordingly.

Local Codes

No route selection is required in this case and only digit manipulation can be carried out.

Distant Codes

A route must be selected and the code points towards a Route List Block.

Route List Block

A Route List Block can be pointed to by one or more distant codes and contains the first and subsequent choice routes to be selected for this call. Certain criteria must be met to allow a choice of Route, the most used ones being the time of day as set in the Time of Day Schedule and the minimum FRL required by the call originator.

A Route can also be defined as an Expensive route in a particular set up case.

Whichever route is selected for a call, a Digit Manipulation Block is selected for that particular case.

Time of Day Scheduling

Up to eight time periods can be set up and if required, a route list block entry can point to a time period for selection.

Digit Manipulation Block

A Digit Manipulation Block can be pointed to from one or more local code or Route List Block entry.

Digit manipulation block number 0 has no effect on digits while other blocks are programmed as required to delete a quantity of leading digits and insert specified digits in front of the remaining digit string.

When selecting a route, the route ACOD does not need to be inserted as route selection is made by the Route List Block.

Network Numbering Plans

The following are descriptions and examples of Network numbering plans available within a Meridian 1 network. The numbering plans available enable connection of Meridian 1 in an existing network although restrictions may be imposed by limitations and working methods of other PBXs.

These numbering plans are fully supported on a Q.931 network.

Certain restrictions exist when Meridian 1 is connected using DPNSS1, DASS2 or APNSS although this does not affect connectivity. These restrictions will be detailed later.

These numbering plans are achieved from two base plans:

- 1** UNIFORM DIALLING - users dial a network access code followed by a location code followed by the required DN number.
- 2** CO ORDINATED DIALLING - The dialled number is used to identify the distant node and may be the whole of the required DN number.

The numbering plans used allow for access to and from the public network either direct or via another node.

Uniform Dialing

Each PBX has its own Location code (LOC) and access from users is by dialing a network access code.

DNs can be the same in each Node.

DNs can be the same as Location codes at other nodes.

Uniform dialing is achieved using the Network Alternate Route Selection feature (NARS).

When using Network Alternate Route Selection (NARS), two network access codes can exist (AC1, AC2).

There is no strict rule as to the use of these access codes but one will be used for the Public network and the other for the Private network.

If required, Dial Tone can be given after the Access Code.

AC1 or AC2 is 1 - 4 digits.

LOC is 1 - 7 digits.

DN is 1 - 7 digits.

**** LOC + DN can be maximum 10 digits.**

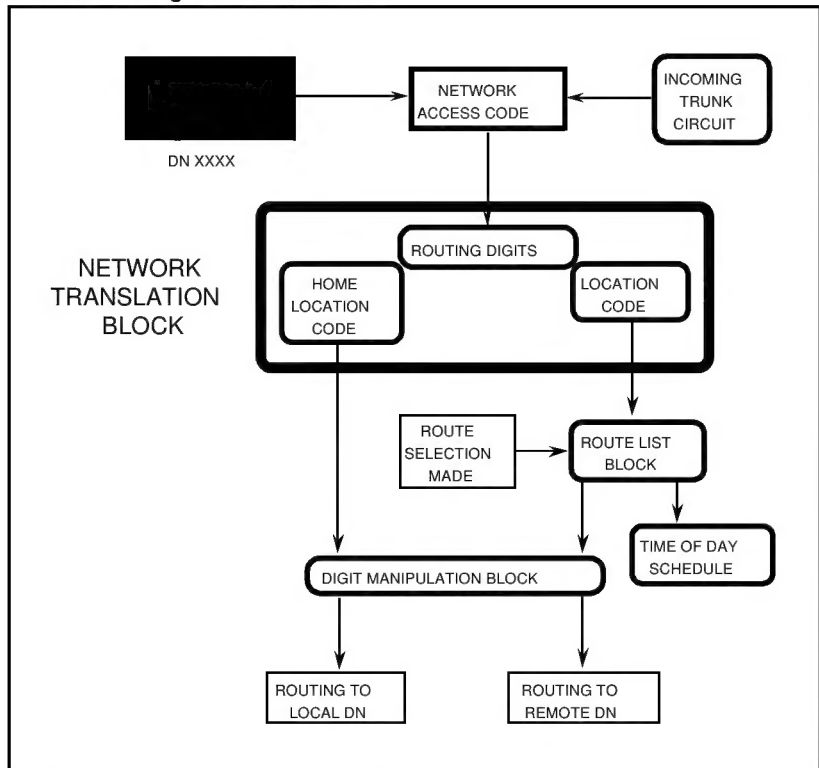
The number of digits expected can be specified for each Location Code.

The access code is used to reach the network translation tables and must be re-inserted if necessary.

Refer to later sections on the following:

- Use of AC2
- Private Network break out to Public Network
- Recognition of On Network numbers

Figure 84
Uniform Dialing Plan Schematic



Programming of Uniform Dialing

Programming for all Network numbering plans is done in overlays 86, 87 and 90 with some areas being unique to the feature (NARS or CDP) and some being common to all (Digit manipulation blocks and Route list blocks). Whichever dialing plan is used, the common areas can be used by both.

The following procedures will cover the necessary overlays and prompt/responses to set up a Uniform Dialing plan:

Step 1: LD 86—ESN Data Block

This sets several general items, and would normally be set once and then changed occasionally. When setting the ESN data block, several other prompts relating to maximums must be answered and should be set to 0 if not used.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	ESN	NARS/ BARS data block
MXLC	0-999	Max. no. of network location codes
MXDM	1-1000	Max. no. of digit manipulation tables
MXRL	0-999	Max. no. of Route list table
AC1	xxxx	1-4 digit Network access code one
AC2	xxxx	Network access code two
DLTN	YES/NO	Dial tone after AC1 or AC2
TODS		Time of day schedule for use from route list blocks
	0-7, 0-23, 00-59, 0-23 00-59	Schedule number, start time, end time

Step 2: LD 87—Network Control Block

This must be set before any translations are programmed even if all values are set to default. This may have been previously set if NCOS and FRL have been linked to set up NFCR.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	NCTL	Network control block

Step 3: LD 86—Digit Manipulation Block

Whichever dialing plan is used, digit manipulation blocks must be programmed first.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	DGT	Digit manipulation data block
DMI	XXX	Digit manipulation table index number
DEL	(0)-15	No. of leading digits to be deleted
INST	xxx....xx	leading digits to be inserted (0-20)

Step 4: LD 86—Route List Data Block

The programming in the Route list block is the part that selects the route for an outgoing call together with the criteria to allow that route to be selected. Each Route List Block can have 64 entries, entry 0 being the first choice route then entry 1 as the 2nd choice etc.)

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	RLB	Route list data block
RLI	xxx	Route list index number
ENTR	xx	Routing option (0-63)
ROUT	xxx	Route number
TOD	0-7	Time of day control as set in stage 1
DMI	xxx	Digit manipulation table number

Step 5: LD 15—Customer Data Block

Program as required for the particular setup.

Prompt	Response	Description
REQ	CHG	
CUST	XX	Customer number
AC2	LOC	If AC2 is used for uniform dialing
HLOC	XXX	Home location code to be sent with calling line ID

Step 6: LD 90—Network Translation Block

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	NET	Network translation tables
TRAN	AC1/ AC2	Translation is for AC1 or AC2

For Home Location Code:

TYPE	HLOC	Home location code
HLOC	xxxxxxx	Home location code (up to 7 digit)
DMI	xxx	Digit manipulation table

For Distant Location Code:

TYPE	LOC	Network locations
LOC	xxxxxxx	Location code (up to 7 digit)
FLEN	(0)-10	Number of dialled digits following AC1/AC2
RLI	xxx	Route list table index no.
LDN	xxxx	Listed directory of the location Note: Digit(s) must be entered against LDN although they have no significance in the UK

Co-ordinated Dialing

Co-ordinated Dialing Plan (CDP) identifies up to 7 digits of a dialled string and routes the call according to the Network numbering plan.

The differences in a network using CDP is in the digits dialled by the user, the length of the DN numbers and the spread of unique numbers in each Network node.

In all cases, a unique number must be identified to control routing of calls, this number being called a Steering Code.

LOCAL STEERING CODE (LSC) - this is used to route a call locally, the digits normally being received on an incoming trunk circuit although they may be dialled locally.

DISTANT STEERING CODE (DSC) - used when the digits dialled or digits received from an incoming trunk are for a Network DN.

Maximum digits for DSC + DN is 10.

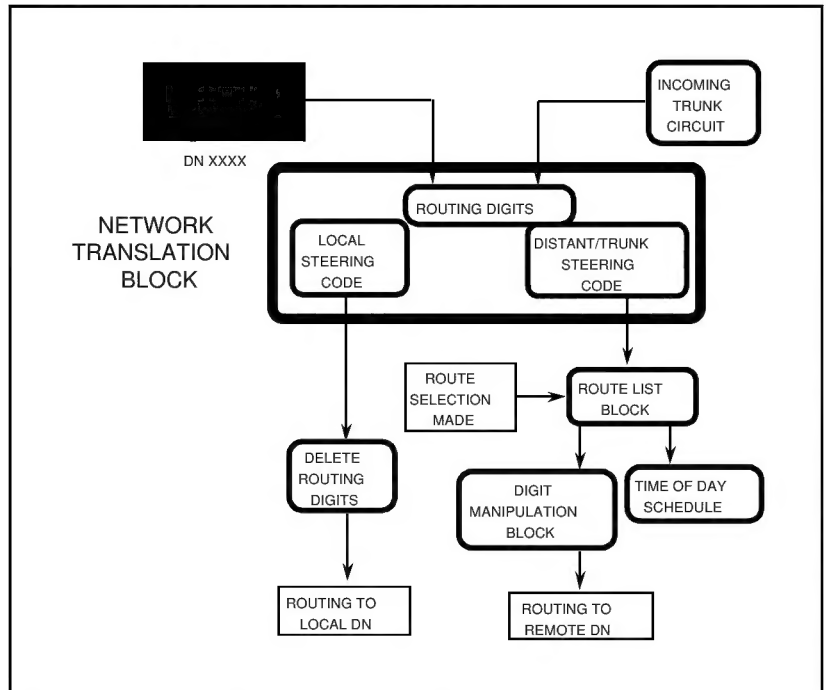
TRUNK STEERING CODE (TSC) - used for the dialing of Off Network numbers that may require breakout over the Private network or dialing to other private networks with unknown digit lengths.

Maximum digits for TSC + DN is 16.

Steering codes can be 1 - 7 digits and up to 10,000 steering codes can be specified in each Meridian 1 node.

The expected number of digits can be programmed against each DSC or TSC.

Figure 85
Co-ordinated Dialing Plan Schematic



Vacant Number Routing

The use of a fully transferable numbering scheme as shown in CDP example 3, would require programming in every node of a Network when a DN is moved between sites, as well as extensive programming to set up the Network.

The feature Vacant Number Routing (VNR) allows nodes within the Network to use another 'Database Node' for call routing.

A node that uses VNR must be no further than 1 hop from a Database node although more than 1 database node may exist within the network.

When a node is programmed for VNR, all calls originating within that node to a Vacant number are routed to a Database node for action.

Programming a Co-ordinated Dialing Plan

Programming for the Network numbering plans is done in overlays 86, 87 and 90 with some areas being unique to the feature (NARS or CDP) and some being common to all (Digit manipulation blocks and Route list blocks). Whichever dialing plan is used, the common areas can be used by both.

The following procedures will cover the necessary overlays and prompt/responses to set up a Co-ordinated Dialing plan:

Step 1: LD 86—ESN Data Block

This sets several general items, and would normally be set once and then maybe changed occasionally. Some items are not relevant to all Network set ups. When setting the ESN data block, several other prompts relating to maximums must be answered and should be set to 0 if not used.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	ESN	NARS/ BARS data block
MXDM	1-1000	Max. no. of digit manipulation tables
MXRL	YES/ NO	CDP feature allowed
MXSC	0-10000	Max. no. steering codes
NCDP	3-10	Maximum number of digits in CDP DN
TODS		Time of day schedule for use from route list blocks
	0-7, 0-23, 00-59, 0-23 00-59	Schedule number, start time, end time

Step 2: LD 87—Network Control Block

This must be set before any translations are programmed even if all values are set to default. This may have been previously set if NCOS and FRL have been linked to set up NFCR.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	NCTL	Network control block

Step 3: LD 86—Digit Manipulation Block

Whichever dialing plan is used, digit manipulation blocks must be programmed first.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	DGT	Digit manipulation data block
DMI	XXX	Digit manipulation table index number
DEL	(0)-15	No. of leading digits to be deleted
INST	xxx....xx	leading digits to be inserted (0-20)

Step 4: LD 86—Route List Data Block

The programming in the Route list block is the part that selects the route for an outgoing call together with the criteria to allow that route to be selected. Each Route List Block can have 64 entries, entry 0 being the first choice route then entry 1 the second choice, etc.

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	RLB	Route list data block
RLI	xxx	Route list index number
ENTR	xx	Routing option (0-63)
ROUT	xxx	Route number
TOD	0-7	Time of day control as set in stage 1
DMI	xxx	Digit manipulation table number

Step 5: LD 15—Customer Data Block

Program as required for the particular setup.

Prompt	Response	Description
REQ	CHG	
TYPE	CDB	Customer Data Block
CUST	XX	Customer number
HLOC	XXX	Location code sent with calling line ID
LSC	XXX	Local steering code to be sent with calling line ID

Step 6: LD 87—Configuration of CDP

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	CDP	Coordinated dialing plan
RLI	xxx	Route list index number
ENTR	xx	Routing option (0-63)
ROUT	xxx	Route number
TOD	0-7	Time of day control as set in stage 1
DMI	xxx	Digit manipulation table number

For Local Steering Code

Prompt	Response	Description
TYPE	LSC	Local steering code
LSC	xxxxxx	Local steering digits (1- 7-digit)
DMI	xxx	Digit manipulation block to use Note: DMI is only prompted with LSCM package
DEL	xxx	No. of leading digits to be deleted

For Distant Steering Code

Prompt	Response	Description
TYPE	DSC	Distant steering code
DSC	xxxxxx	Distant steering digits (1- 7-digit)
FLEN	(0)- 10	Expected dialled digits
DSP	LSC HLOC DN	Display option to destination as set DN only is sent

Configuring Vacant Number Routing (VNR)

The UDP / CDP must have been configured before the VNR feature is configured in the database.

- 1 Configure the required Route List tables in LD 86.

NOTE - Digit manipulation is not allowed when using VNR and the Route list block must point to DMI 0.

- 2 Configure VNR in LD 15 as follows

Prompt	Response	Description
REQ	CHG	
TYPE	CDB	
CUST	xx	
VNR	YES/(NO)	Vacant Number Routing
RLI	xxx	Route list table
CDPL	1-(10)	No. of dialled digits for CDP
LOCL	1-(10)	No. of dialled digits for LOC

Group Dialing

Group dialing is purely a name for a mixture of the uniform and co-ordinated dialing plans.

Groups of PBXs are configured for co-ordinated dialing, and allocated a location code. The groups are configured together as in uniform dialing, users dialing the network access code to make calls outside their own zone.

All the rules of NARS and CDP exist within themselves.

When using NARS and CDP together, certain rules must be followed when routing within the Network translation tables.

Allowed - HLOC routed to Steering code

Not Allowed - LSC routed Steering code

Mixed Length CDP Networks

This type of dialing plan is similar in theory to the Group dialing plan but with the ability to use CDP throughout.

The example below duplicates the previously used group dialing plan with the users dialing the same digits, the network access code being used as part of the steering code.

The one rule which must be strictly followed in this situation is that relating to call routing after analysis as a Local Steering Code.

A local Steering Code must be terminated locally.

Alternate Routing

If a call cannot be made over the first choice route (entry 0 in the route list block), the next entry will be looked at and actioned accordingly.

A typical route list block will be programmed as follows:

— Entry 0 - shortest route to the destination within the Network

- Entry 1 - alternate route within the Network
- Entry 2 - route via PSTN by deleting digits and inserting PSTN code for destination.

Every entry in a route list block will be tried even though all the entries may not be sequential.

During call set up a call cannot return over the same route that it originated from (anti-tromboning) and if this situation occurs, this will be treated as congestion and the next choice will be made from the route list block.

The use of alternate routing in a complex network must be well planned and it is also possible to perform digit conversion to give a dummy steering code to route a call under different control throughout the network.

The use of the Drop back busy feature must also be taken into consideration.

Calling Line Identity

The Calling Line Identity (CLI) or Originating Line Identity (OLI) is the network number belonging to the originator of a call which is sent to the destination. The CLI is used for display purposes if the destination can receive this and is also used for networking features e.g. Ring Again and CLID in CDR. The CLI is formed from the originating extension DN prefixed by a site code programmed in Overlay 15, although there are several options available.

When making calls in a Q931 Private network, the CLI should be prefixed by the letter "H" indicating that the call has been identified as having a valid call type. If the "H" is missing, features will not be able to be invoked.

The above applies to Q.931 trunks only. DPNSS1 trunks have specific rules that are covered later in this chapter.

Private Network Hop Off

Private network hop off or break out is a means of making a call to the public network via a node in the private network that will give the lowest cost call. Each node in the network is programmed to either give immediate break out to PSTN or send the dialled digits towards another node.

This can be achieved with either CDP using Trunk Steering Codes (TSC) or using Basic Alternate Route selection (BARS). Some public exchanges may reject local calls that are accessed using the STD code. This can be avoided by deleting the STD code in digit manipulation at the break out exchange.

Private Network Hop Off using CDP

The PSTN access code (normally 9) followed by the STD code to be identified is programmed as a Trunk Steering Code and route selection will be made as with Distant Steering Codes according to the required routing.

A maximum of 7 digits can be identified as a TSC and the total dialled digits can be up to 16. All codes that could be dialled must be entered as Trunk Steering Codes being either 4 or 5 digits e.g. 9021/90753/9071.

The following is the programming relating to Trunk Steering codes presuming that the control blocks, digit manipulation and route list blocks have been programmed.

Step 1: LD 87—Network Control Block

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	CDP	Coordinated dialing plan
TYPE	TSC	Trunk steering code
TSC	xxxxxx	TSC digits (1 - 7 digit)
FLEN	(0) - 16	Expected dialled digits
RLI	xxx	Routing list index number

Private Network Hop Off using BARS

Basic Alternate Route Selection has only one Access code (AC1), although when the NARS software exists then AC1 and/or AC2 can be used for any feature of NARS or BARS. The following are the options available as types of call following a BARS/NARS access code:

- 1 LOC - Private Network Location code
- 2 HLOC - Private Network Home Location code
- 3 NPA - Public Network Area code
- 4 HNP - Public Network Home Area code
- 5 NXX - Public Network Central Office code
- 6 SPN - Special Number (1-10 digits)

Options 1 and 2 have been described earlier and options 3, 4 and 5 are designed for the North American market.

Special Numbers (SPN) are programmed to give break out within a Network.

The Access code used, AC1 or AC2 is programmed with the Public Network access code (normally 9) then each STD code is programmed as a SPN which is then pointed towards a Route List block to give the required route selection.

Dial tone can be given following AC1/AC2 if required.

AC1/AC2 must be inserted with digit manipulation if the call is routing via the private network.

Identification of On Network Numbers

This is the ability to identify a dialled PSTN number as one that belongs to one of the nodes on the Private network, then performing digit manipulation on the dialled number to route it via the Private network for termination.

The flexibility of the feature could identify a private network number and route via the PSTN.

This is achieved by using Basic Alternate Route selection (BARS), and Special numbers (SPN). The feature called Supplemental Digit Restriction and Recognition is used where numbers dialled following a SPN are compared to those programmed and if a match is found then different routing action is taken.

This feature can be used separately or in conjunction with break out.

Numbers can be identified as:

- A local DID number that should be terminated using part of the dialled number to identify the DN. This is done by pointing the code direct to a Digit Manipulation Block. (LDID)
- A local non DID number that will be routed to the attendant via the Listed directory number (LDN). No digit manipulation is necessary as routing is made automatically. (LDDD)
- Alternate Routing Remote Number which will point the call at an Alternate Route List Index (ARLI) enabling either different routing or routing using different Digit Manipulation. (ARRN)

Overlay 90 also allows numbers following SPNs to be programmed as DID and DDD codes but ARRN gives more flexibility and has been designed for UK applications.

Programming of BARS

The following is the programming for BARS Special numbers to give either network hop off and/or identity of on network numbers. It is presumed that network control blocks, digit manipulation and route list blocks have been previously programmed.

Step 1: LD 90

Prompt	Response	Description
REQ	NEW, CHG, PRT, OUT	
CUST	XX	Customer number
FEAT	NET	Network translation tables
TRAN	SPN	
SPN	XXXX XXXX XX	Code for routing must be entered as groups of 4 digits separated by space (max 10 digits)
FLEN	(0) - 16	Number of digits dialled following AC1/AC2
RLI	XX	Route list index for call routing
SDRR	LDID LDDD ARRN	Enter type of digit recognition required, or <cr> to return to SPN prompt
SPN	XXX	More special numbers or <cr> to exit

Step 2: LD 15

Prompt	Response	Description
REQ	CHG	
TYPE	CDB	Customer Data Block
CUST	XX	Customer number
AC2	SPN	Only if using AC2

Programming for Supplemental Digit Recognition

Local DID Numbers

Step 1 - LD 90

Prompt	Response	Description
SDRR	LDID	Supp. digits are local DID
DMI	XX	DMI to be used with this LDID code
LDID	XXXX	LDID digits
LDID	XXXX	Other digits or <cr> to return to SDRR for more recognition against the same SPN.

Local Non-DID Numbers

Step 1 - LD 90

Prompt	Response	Description
SDRR	LDDD	Supp. digits are local attendant
LDDD	XXXX	LDDD digits
LDDD	XXXX	Other digits or <cr> to return to SDRR for more recognition against the same SPN.

Remote Numbers

Step 1 - LD 90

Prompt	Response	Description
SDRR	ARRN	Supp. digits are for remote routing
ARRN	XXXX	Digits for alternate routing
ARLI	XX	Route list index for this ARRAN
ARRN	XXXX	Another number or <cr> to return to SDRR for more recognition against the same SPN.

Number Lengths

With Q.931, the outgoing call setup message will not be sent until certain criteria has been met, which differs slightly between UDP and CDP.

Uniform Dialing - NARS/BARS

The call setup message is sent on one of the following:

- 1 The number of digits is equal to the programmed number length (FLEN).
- 2 The Network interdigit timeout (NIT in overlay 15) has been reached.
- 3 The # key has been pressed.

If FLEN is set to 0, then point 1 will never occur.

The call will not setup if the number of digits dialled is less than the length of the LOC or SPN.

The value of FLEN should always be set to the maximum possible digit length.

Figure 86
CDP Number Lengths

TYPE OF NUMBER	MAXIMUM FLEN
DSC	10
TSC	16

FLEN GREATER THAN 0		
DIGITS DIALLED	FLEN	CALL SET UP
X	LESS THAN X	WHEN FLEN IS REACHED
	X	AFTER X DIGITS
	GREATER THAN X	AFTER NIT OR #
LESS THAN DSC or TSC	ANY VALUE	CANNOT SETUP

NCDP	LSC LENGTH	DEL	RESULT
4	ANY	< 4	OK
		> 3	NOT OK
9	ANY	> 1	OK
		< 2	NOT OK
10	< 3	ANY	NOT OK
	> 2	ANY	OK

Number Lengths using CDP

The call setup message is sent on one of the following:

- 1 The number of digits is equal to the programmed number length (FLEN).
- 2 The Network interdigit timeout (NIT in overlay 15) has been reached.
- 3 The # key has been pressed.
- 4 When the value of NCDP in overlay 86 has been reached and FLEN is set to 0.

The call will not setup if the number of digits dialled is less than the length of the DSC or TSC.

The value of FLEN should always be set to the maximum possible digit length as it overrides the use of NCDP.

CDPL In Overlay 86

As mentioned above, the value of NCDP is overridden by that of FLEN, but the following factors should be taken into account when setting this value:

- 1 The value of NCDP minus the number of digits deleted against any LSC must be greater than 0 and less than 8.
- 2 The value of NCDP minus the length of any LSC must be less than 8.

The value of NCDP cannot be changed if any Steering codes exist.

Figure 87
CDP Number Lengths

TYPE OF NUMBER	MAXIMUM FLEN
DSC	10
TSC	16

FLEN GREATER THAN 0		
DIGITS DIALLED	FLEN	CALL SET UP
X	LESS THAN X	WHEN FLEN IS REACHED
	X	AFTER X DIGITS
	GREATER THAN X	AFTER NIT OR #
LESS THAN DSC or TSC	ANY VALUE	CANNOT SETUP

NCDP	LSC LENGTH	DEL	RESULT
4	ANY	< 4	OK
		> 3	NOT OK
9	ANY	> 1	OK
		< 2	NOT OK
10	< 3	ANY	NOT OK
	> 2	ANY	OK

Access Control and Restrictions

Several parts of the software can control access to trunks and give restrictions, many of which are not envisaged to be used in Europe.

Those used are mentioned below and detail is given where these affect Networking.

TGAR to TARG

Using the route ACOD will always follow TGAR to TARG.

Using CDP overrides any TGAR to TARG.

Using BARS/NARS gives the option to follow or override TGAR to TARG on a customer basis.

In LD 86:

Prompt	Response	Description
REQ	CHG	
CUST	XX	
FEAT	ESN	NARS/ BARS data block
TGAR	YES (NO)	Follow TGAR to TARG barring Override TGAR to TARG

Trunk group busy keys

The operation of trunk group busy keys on the Attendant console will block access to that particular route if the call originator has a TGAR of 7 or less irrespective of the dialing method used.

NFCR trees

A call originators FRL value will still be applied on a route selected with NARS, BARS or CDP and follow the same rules as if the call was made using the ACOD.

If code restrictions are to be applied on a remote site, then the trunks at that site must have CLS=TLD as the call originators CLS is not passed around the network. It is recommended that code restrictions are not applied around the network, but at the point where the call breaks out.

NCOS - FRL

The NCOS of a call originator can be sent around a Q931 network to control any further routing of that call, but if a call is originated from a point without a NCOS then on a transit call the NCOS of an incoming route will be used.

In each node within the network that route selection is made, the NCOS is associated with a FRL.

Under normal circumstances, all NCOS to FRL linking within a network would be the same.

To send NCOS, follow this procedure:

In LD 16 - Route Data Block:

Prompt	Response	Description
REQ	CHG	
TYPE	RDB	
CUST	xx	
ROUTE	xx	
SIGO	ESN3	Sends NCOS to interworking switch. Must be set at both ends

When the NCOS is sent, this can be seen in the digits in call trace. The two digits for the NCOS are always prefixed by 1.

Route list block

Each entry in a route list block can be assigned a minimum FRL to be allowed that particular choice of route.

If the FRL prompt is set to 3 then only calls with a FRL of 3 and above can select that route.

The above mentioned is the normal situation and the prompt 'MFRL' in the Route list block is set to the default 'MIN'.

If the prompt 'MFRL' is set to a value between 0 and 7 then this will be the minimum FRL allowed access to all entries in the Route list block.

Schedule Access restrictions

Schedule Access restrictions control an extensions class of service values which would then be applied to the call in accordance with the above mentioned points.

Access Restriction Tables

Any settings made in overlay 56 for the barring of trunk to trunk connections will apply to all calls.

DPNSS1 Considerations

Meridian 1 is designed to use Q931 as its networking protocol and the main aspects of networking features are designed around this.

In the UK, DPNSS1 is widely used and to meet the requirements of connecting to a DPNSS1 network the X20 version of software has been merged into X11 to handle IDA trunks.

The limitations are still the same as in X20 and the following considerations have to be made:

- 1** NARS is not supported
- 2** Outgoing calls can be made using CDP or BARS special numbers
- 3** Incoming calls must be terminated using CDP local steering codes or direct to DN
- 4** Transit calls should use CDP distant or trunk steering codes
- 5** The OLI/CLI sent is made up of LSC + DN (LSC in overlay 15)
- 6** Any digits programmed against INST in LD 16 will be inserted for routing and also in front of the received OLI/CLI string.

Points 1 to 4 above relate to the routing of a call and fit into the examples covered earlier in this section.

Points 5 and 6 must be closely looked at if Meridian 1 is connecting to a DPNSS1 network which uses anything more complicated than a simple linked numbering plan (CDP in meridian language).

OLI/CLI in a DPNSS1 Network

Several complexed numbering schemes may exist on DPNSS1 networks with different switches having different methods of sending OLI/CLI and some having the ability to carry out digit manipulation on this string.

The OLI/CLI string received must be sufficient to route the call back to the originator and Meridian 1 can insert a digit(s) into this string in overlay 16 (INST) if the full routing digits are not received.

The example opposite shows Meridian 1 connected to an existing network using location code working.

The OLI/CLI within the existing network is 60X+XXX and the receiving node knows that it is a network call so that it inserts the network access digit.

The OLI/CLI from node C to node M is 603+XXX, which will not be enough to route the call back from node M to C. The insert digit on the route makes the OLI/CLI 7+603+XXX, which meets the dialing plan of node M.

Calling from node M into the network, the digit 7 is built into the steering code but we do not want to send an OLI/CLI string to include that digit as it would not match that being sent around the existing network. The LSC as programmed in LD 15 would be set to only the location code of node M.

If the DDSL monitor is being used, then the insert digit would not be seen on the incoming side.

Digit Conversion Interactions

If any combination of digit conversion occurs in a network call, then the schematic opposite can be followed for sequencing the possible conversions.

Local Steering Code Modification

All the previously described use of local steering codes allow only the deletion of digits although a software package exists which will allow both deletion and insertion (package LSCM).

If this package is equipped then both options will be given as shown in the NTP for overlay 87.

This feature has also been used in the field to give a form of pretranslation on locally dialled digits that are not actually used for networking.

Network Attendant Service

Network Attendant Service (NAS) gives the ability to have attendants at any one or more sites within a Network, with routing control and also signaling to control attendant features.

Only network attendant basic routing is supported over DPNSS1 links.

Network Attendant Routing

Routing will take place under one of the following situations:

- 1 The PABX is in night service and a NAS key is operated on the attendant console.
- 2 The PABX is in day service with the NAS key operated and the call waiting threshold has been reached (CW lamp flashing).
- 3 No attendant exists on the PABX and programming is set for permanent NAS.

Once one of the above criteria is met, any call destined for the attendant is then routed according to the programming of the NAS routing tables.

Each attendant or attendant group in the network is given a unique identity number which must not conflict with any other dialled digits. These numbers are then programmed in the Network translation tables and use route list blocks and digit manipulation to point them towards the distant attendants.

If the distant attendant is only one hop away, then it is only necessary to send 0.

If the distant attendant is via another node then the unique ID should be sent to the transit node.

The above two rules should be followed as it is not desirable to use the normal network numbering plans which may have alternate routing set.

Each remote attendant should be accessed by only one possible route.

Routing Control

When a call arrives that is to be routed to a remote attendant, the following procedure takes place:

- 1** Refer to a Time of Day schedule which will give up to four choices of remote attendant.
- 2** Attempt to route the call to the first choice remote attendant.
- 3** If not possible try the next choice(s).
- 4** If no choices available route to local Night service.

Up to seven different remote attendants can be programmed although only four can be selected at any one time of day.

Routing to a next choice attendant will only be attempted if the route is congested or down.

In other cases the call will either:

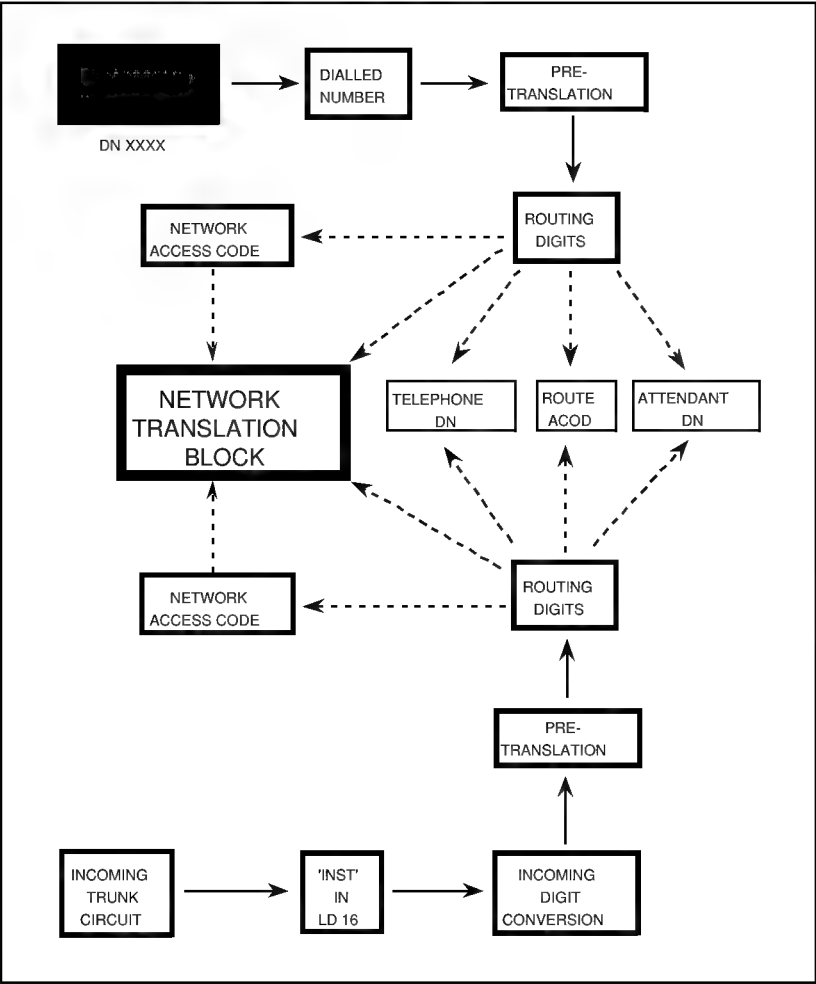
- 1** Join the queue for the attendant choice.
- 2** Route to the night service DN for the attendant choice.
- 3** Follow NAS routing for the attendant choice.

A queuing option does exist on busy routes but it is not envisaged to use this in the UK.

Signaling

Each D channel must be programmed for NAS signaling which sends all relevant control data plus the originating call type enabling the option of appearance on different ICI keys.

Figure 88
Meridian 1/SL-1 Call Routing Schematic



Configuring Network Attendant Service (NAS)

The NARS/CDP networking routing database must be configured first before the NAS feature can be programmed.

Step 1: Use LD 15 to configure control of NAS routing.

Prompt	Response	Description
REQ	CHG	
CUST	XX	
ICI	xx NCO xx NTIE xx NDID	Network COT calls Network TIE calls Network DID calls
NAS ATCL	(NO) YES	(Disallow) allow network attendant control
NAS ACTV	(NO) YES	(Disable) enable NAS routing

Step 2: Use LD 17 to configure NAS signaling.

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	
ISDN	YES	
DCHI	xx	DCHI port number
NASA	YES,(N0)	NAS signaling allowed (disallowed)

Step 3: Use LD 12 to configure Attendant NAS key.

Prompt	Response	Description
REQ	CHG	
TYPE	2250	
TN	XX	
KEY	XX NAS	Network Attn service key

Step 4: Use LD 86 to define NAS routing and time schedule.

Prompt	Response	Description
REQ	NEW/ CHG	
CUST	XX	
FEAT	NAS	Network Attn service
TBL	0-63	Table 0 is for the customer, other tables are for Tenant service NAS
ALT	X	1-7 Attendant alternative no.
ID	XXX	Remote attendant access code. This code is programmed in either CDP or NARS to control routing
ALT	<CR>	Carriage to stop ALT
TODS	0	Default catch-all period
ALST	n n n n	Attn alternative list (up to 4 ALT per schedule). If no entry then local Attendant is used
TODS	1-31	
PER	hh mm hh mm	start and stop time, minute must be 0 or 30 start time must be less than stop time
DAYS	D,-- D	up to 7 days (1-7), 1=mon, 7= Sunday
ALST	n n n n	Attn alternative list (up to 4 ALT per schedule).If no entry then local Attendant is used
DBK	y/n y/n y/n y/n	Drop back to originating node if congestion is received from the above Attn alternative list
QUE	y/n y/n y/n y/n	Queuing to a route for the above Attn alternative list
TODS	1-31	Repeated

Configuring DID to Network Digit Conversion

Step	Overlay	Action
1	LD 49	Configure Conversion table
2	LD 16	Allow Digit conversion

Step 1: Use LD 49 to configure Digit Conversion Tables.

Prompt	Response	Description
REQ	NEW, CHG	
TYPE	IDC	
CUST	XX	
.		
DCNO	XXX	(0- 254), Table No.
IDGT	nnnn xxxxxxxx nnnn xxxxxxxx nnnn xxxxxxxx	Note: nnnn= Up to 4 Incoming digits xxxxxxx= Up to 8 digit local or Network DN

Step 2: Use LD 16 to allow Digit Conversion for Route.

Prompt	Response	Description
REQ	NEW, CHG	
TYPE	RDB	
CUST	XX	
ROUT	XXX	
.		
IDC	YES,(NO)	Allow (disallow) Digit conversion
DCNO	XXX	(0- 254), Table No.

Q.931 Drop Back On Busy

The Drop back on Busy feature gives originator control over alternate routing of a call that is being set up over one or more links in a Q931 network and will be used mainly to cover the situation of congestion on a PSTN breakout route, although the feature can be applied to any situation.

When the feature is used, the call will drop back to the originating node, where further routing choices can be made.

To use this feature, NAS signaling must be working on the relevant D channels.

Against any entry in a Route list block, two choices are available as to how congestion will be treated at any point in the network:

- 1 Try every choice available before dropping back to originator.

Answer prompt IDBB with DBA (default)

- 2 Try only a specified number of entries in a route list block before dropping back to the originator. The number of entries is referred to as the Initial set (ISET).

Answer prompt IDBB with DBI

Whichever of the above two choices is made, the relevant information is contained in the call setup message and will not be modified at any tandem node.

To achieve point 2 above, the prompt ISET in a route list block is set with a value between 1 and 32 meaning that dropback will occur if congestion exists after trying that number of entries in the route list block.

If ISET is set to 0 then no entries in that route list block will be tried and drop back will occur immediately.